

**IN THE CLAIMS:**

Please amend claims as follows.

Please cancel claims 1-20 and add new claims 21-42.

1.-20. (Cancelled)

21. (New) A receiving station for a communication system, comprising:  
a signal filter in communication with a signal receiving antenna;  
a signal estimator in communication with the signal filter;  
a signal optimizer in communication with the signal filter; and  
a decision feedback sequence estimator in communication with the signal optimizer.

22. (New) The receiving station of claim 21, wherein the decision feedback sequence estimator comprises:

a prefilter;  
a summing element in communication with the prefilter;  
a feedback filter in communication with the signal optimizer and the summing element;  
and  
a maximum likelihood sequence estimator in communication with the summing element.

23. (New) The receiving station of claim 22, wherein an output of the maximum likelihood sequence estimator is in communication with the feedback filter, and wherein an input of the maximum likelihood sequence estimator is in communication with an output of the summing element.

24. (New) The receiving station of claim 23, wherein the feedback filter comprises a first input in communication with the signal optimizer and a second input in communication with an output of the maximum likelihood sequence estimator.

25. (New) The receiving station of claim 24, wherein the summing element receives inputs from the prefilter and the feedback filter and sends a summed output to the maximum likelihood sequence estimator.

26. (New) The receiving station of claim 21, wherein the signal filter comprises a feed forward filter.

27. (New) The receiving station of claim 25, further comprising:  
a de-interleaver in communication with an output of the maximum likelihood sequence estimator;  
a de-punctuator in communication with the de-interleaver; and  
a channel decoder in communication with the de-interleaver.

28. (New) The receiving station of claim 25, wherein the feedback filter receives optimized signals from the signal optimizer that are used to define filter characteristics of the feedback filter.

29. (New) The receiving station of claim 24, wherein interconnection of the feed forward filter, the feedback filter, the maximum likelihood sequence estimator, and the summing element cooperatively operate to permit concurrent interference and prefilter operations to be performed

30. (New) The receiving station of claim 21, wherein the signal filter and the signal estimator comprise a receive chain.

31. (New) The receiving station of claim 30, wherein the receiving station comprises a plurality of receive chains that corresponds to a plurality of signal receiving antennas configured to receive and transmit a plurality of signal data vectors to the plurality of receive chains.

32. (New) A method of communicating via a multiple input-multiple output communication system, comprising:

receiving a data vector;

forming optimized feed forward filter parameters from the data vector;

forming optimized feedback filter parameters from the data vector;

applying the optimized feed forward filter parameters to a feed forward filter to define filter characteristics of the feed forward filter;

applying the optimized feedback filter parameters to a feedback filter to define filter characteristics of the feedback filter; and

simultaneously performing interference cancellation and pre-filtering operations on the data vector through operation of the feed forward and feedback filters.

33. (New) The method of claim 32, wherein simultaneously performing interference cancellation and pre-filtering operations comprises:

filtering the data vector with the feed forward filter and transmitting a feed forward filter output to a summing element;

receiving an output of the summing element in a maximum likelihood sequence estimator and generating an output that is transmitted to an input of the feedback filter and to a subsequent component; and

filtering the output received from the maximum likelihood sequence estimator in the feedback filter and transmitting a filtered signal to the summing element.

34. (New) The method of claim 32, wherein simultaneously performing interference cancellation and pre-filtering operations comprises filtering data vector and processing the data vector with a decision feedback sequence estimator.

35. (New) The method of claim 32, wherein receiving a data vector comprises receiving a plurality of data vectors on a corresponding plurality of receiving chains.

36. (New) The method of claim 32, wherein each of the plurality of receiving chains comprise:

a receiving filter in communication with a signal receiving antenna; and

a channel estimator in communication with the receiving filter, the channel estimator being in communication with an optimizer configured to generate the optimized feed forward filter parameters and the optimized feedback filter parameters.

37. (New) The method of claim 33, wherein the subsequent component comprises a de-interleaver connected to a de-punctuator, the de-punctuator being connected to a channel decoder.

38. (New) A receiving station for a communication system, comprising:

signal filter means in communication with a signal receiving antenna;

signal estimator means in communication with the signal filter means;

signal optimizer means in communication with the signal filter means; and

interference cancellation means in communication with the signal optimizer means.

39. (New) The receiving station of claim 38, wherein the interference cancellation means comprises:

a prefilter;

a summing means in communication with the prefilter;

a feedback filter means in communication with the signal optimizer means and the summing means; and

a maximum likelihood sequence estimator in communication with the summing element.

40. (New) The receiving station of claim 39, wherein an output of the maximum likelihood sequence estimator is in communication with the feedback filter means, and wherein an input of the maximum likelihood sequence estimator is in communication with an output of the summing means.

41. (New) The receiving station of claim 40, wherein the feedback filter means comprises a first input in communication with the signal optimizer means and a second input in communication with an output of the maximum likelihood sequence estimator.

42. (New) The receiving station of claim 41, wherein the summing means receives inputs from the prefilter and the feedback filter means and sends a summed output to the maximum likelihood sequence estimator, an output of the maximum likelihood sequence estimator being an output from the receiving station.